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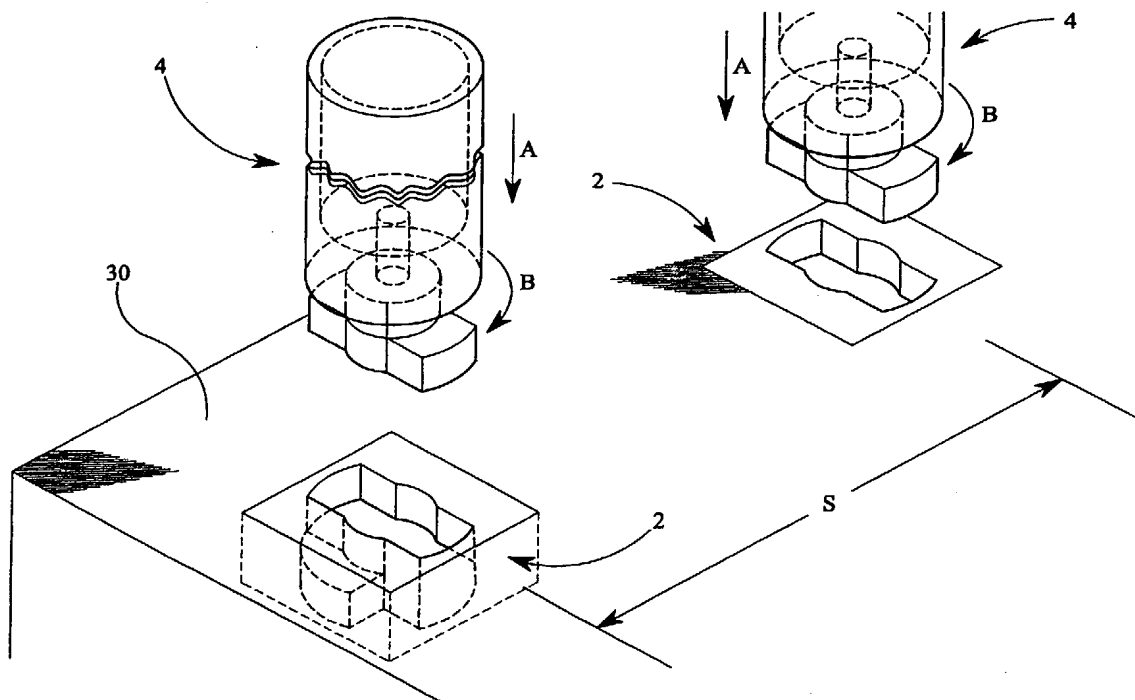
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**E1H HCB H750**

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**DE 019807141 A1** **DE 019512544 A1**

(58) Field of Search  
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INT CL<sup>7</sup> **E02B 3/10 7/00 7/20**  
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(54) Abstract Title  
**Flood defence system having removable support posts**

(57) A flood defence system comprises a plurality of base elements 2, a plurality of support elements 4 for mounting to the base elements and one or more barrier elements (42, Fig 10) for securing to the support elements, where the base elements are located below or beneath ground level 30. In a second embodiment of the invention the support elements are secured to the base elements by a quick release system, which may be an interlock or bayonet system. The interlock system may comprise male (8, Fig 1) and female (10, Fig 3) members which are locked together by means of a rotational movement B which draws the members together. A capping element (70, Fig 19) may be provided to secure the one or more barrier elements between respective support elements.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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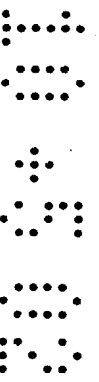
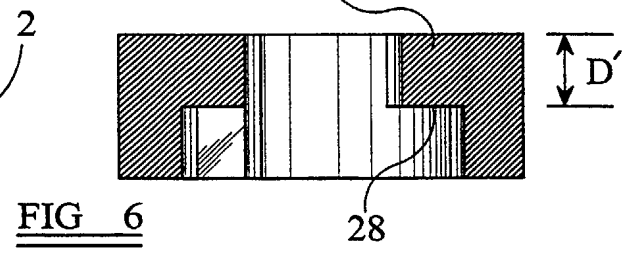
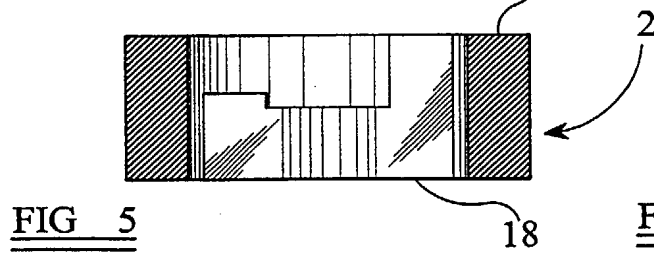
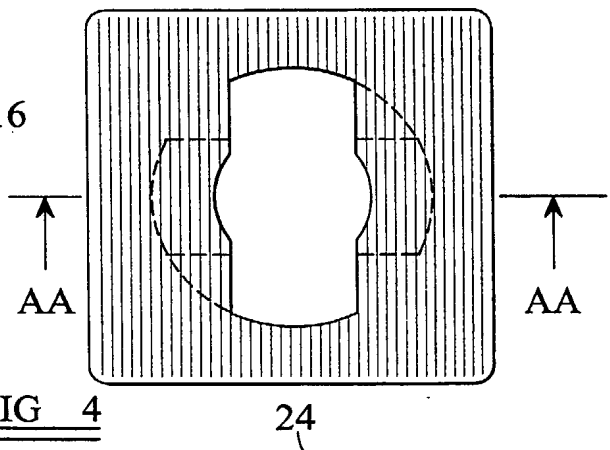
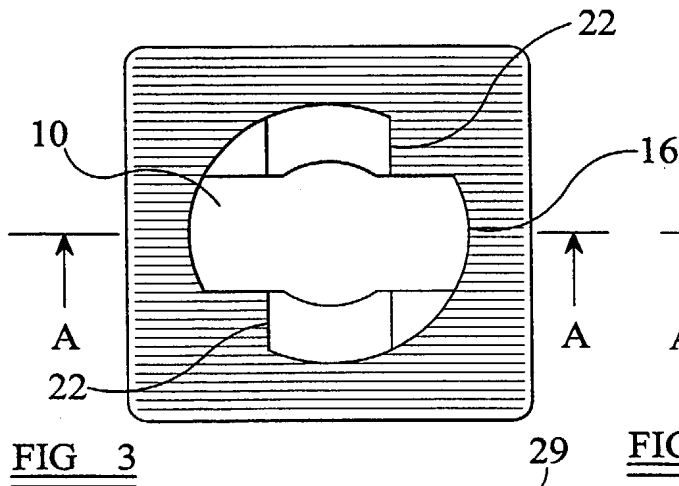
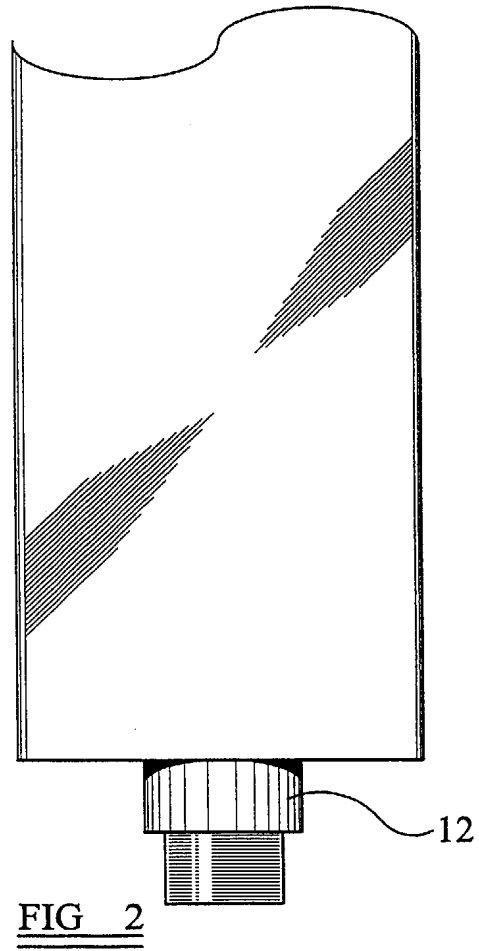
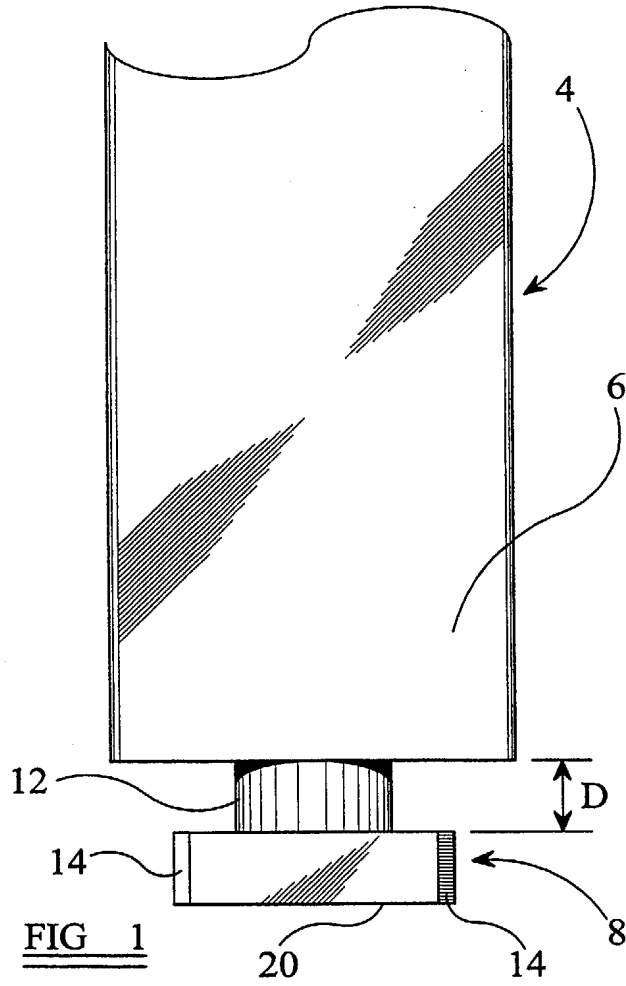


FIG 7

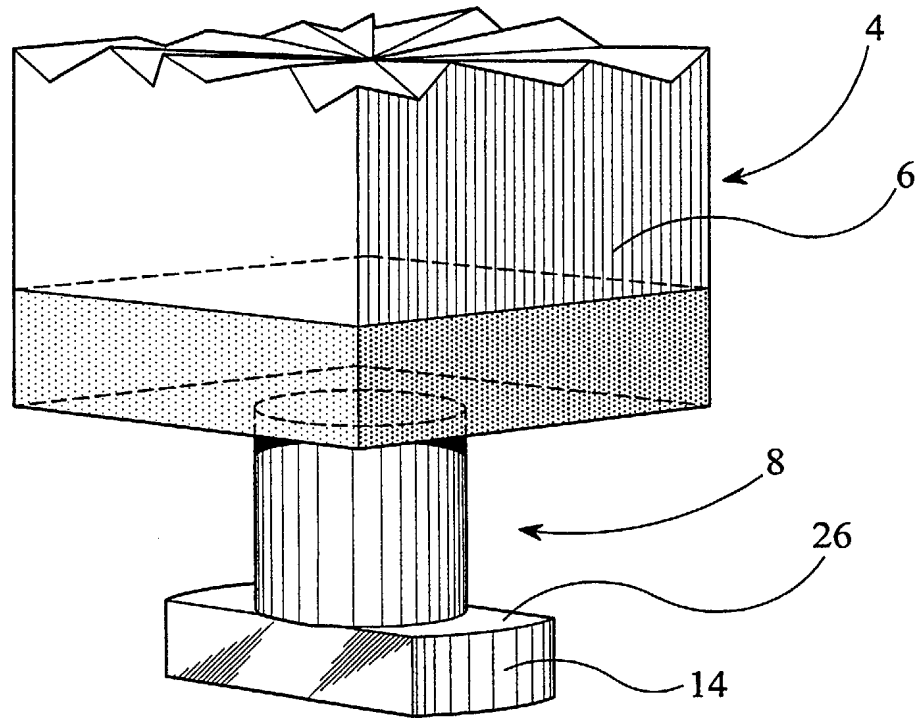
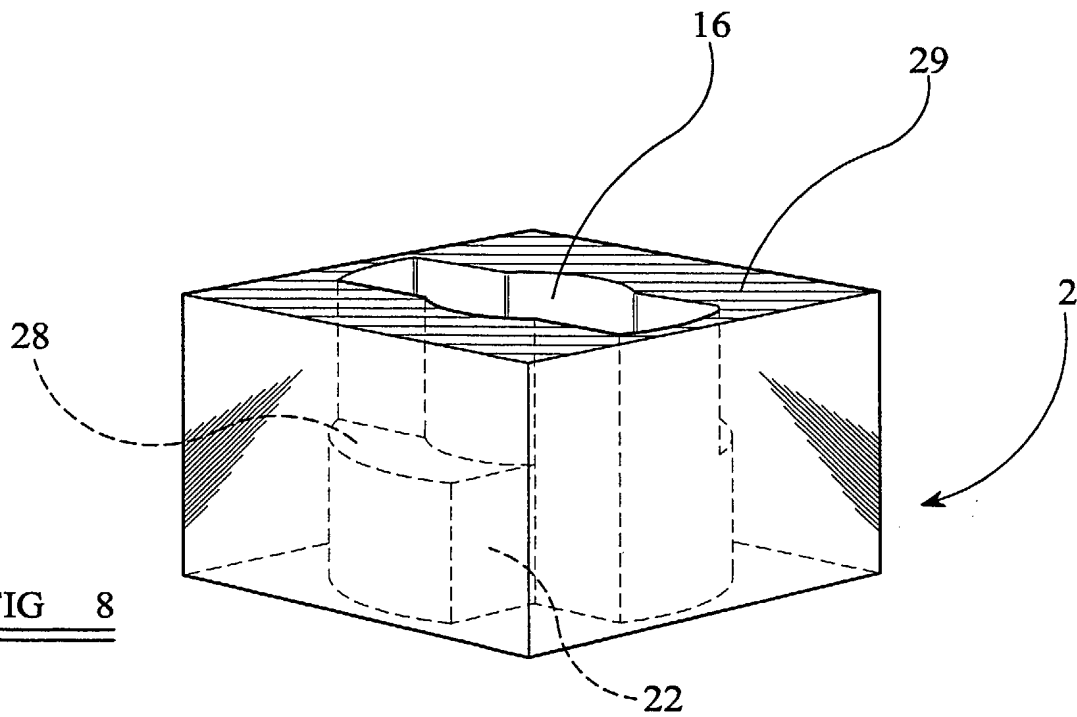
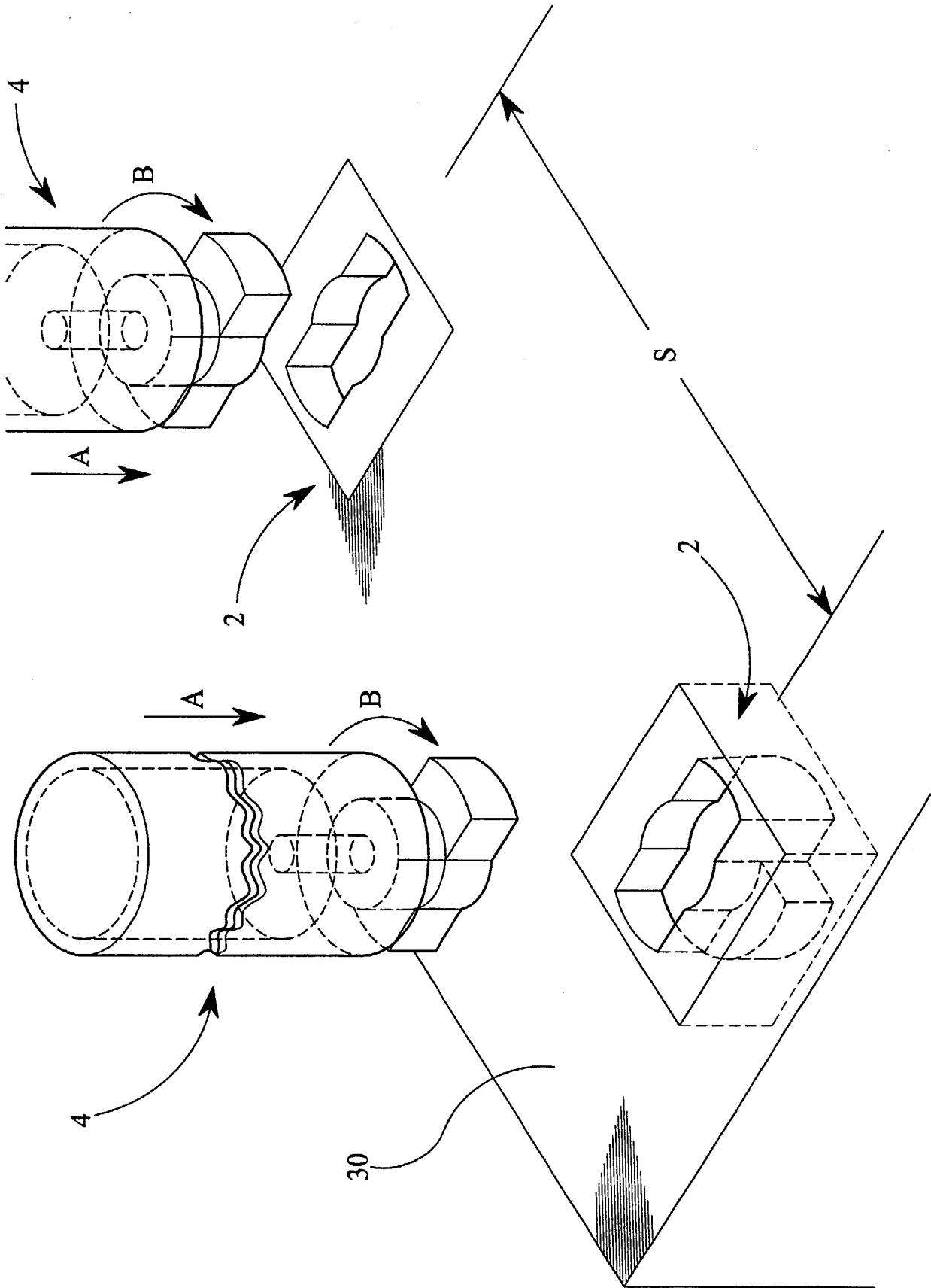


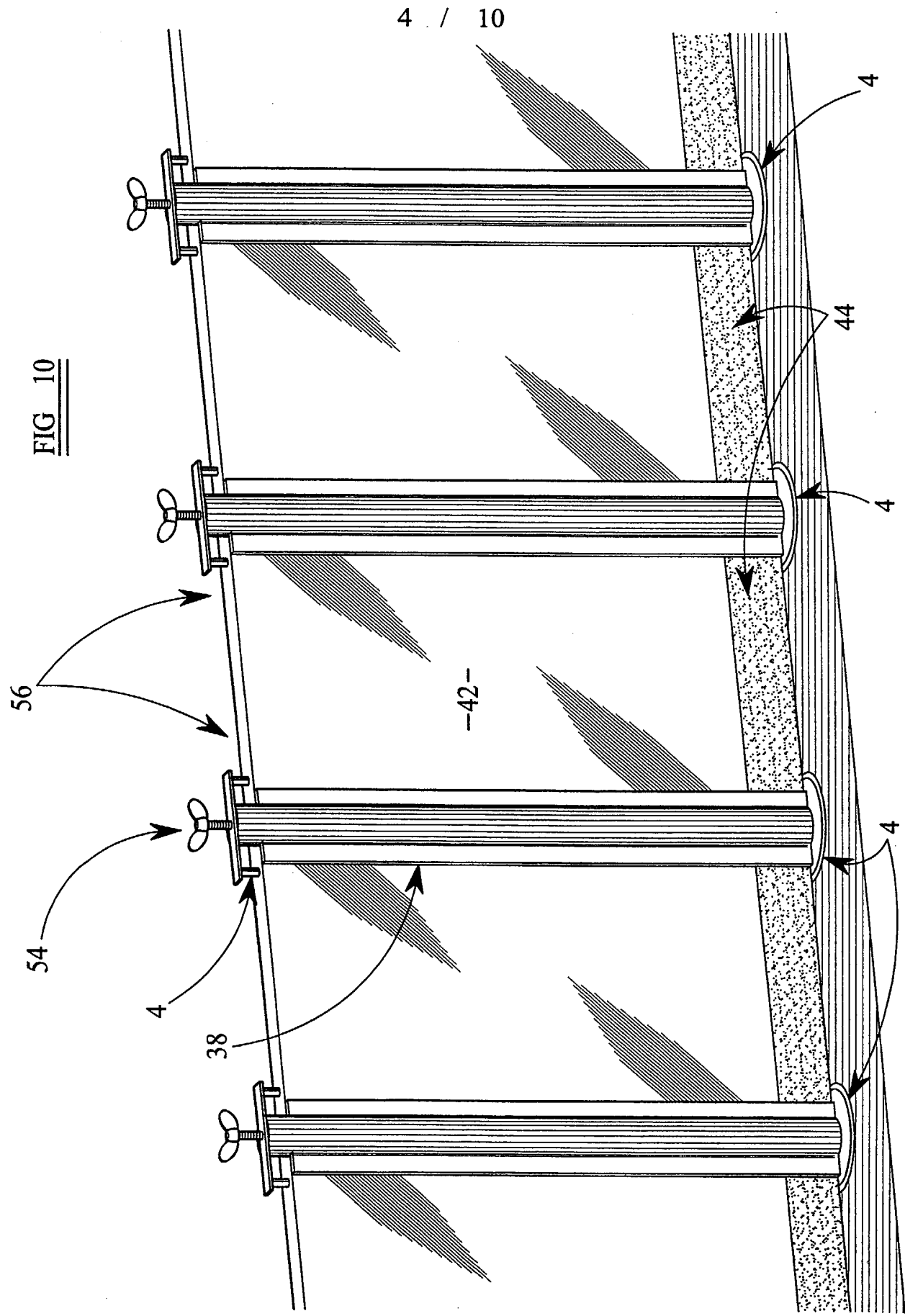
FIG 8





30 30 30

FIG 10



20 30 40 50

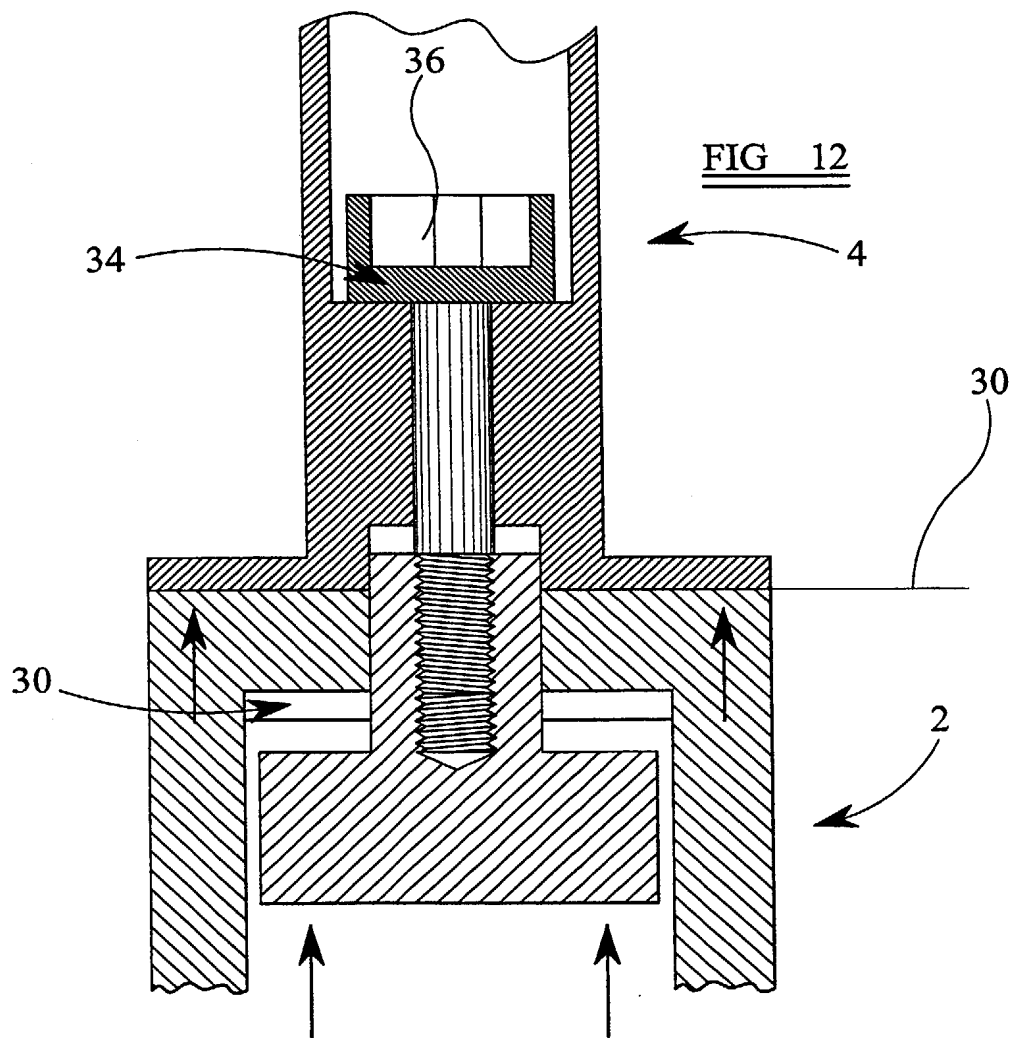
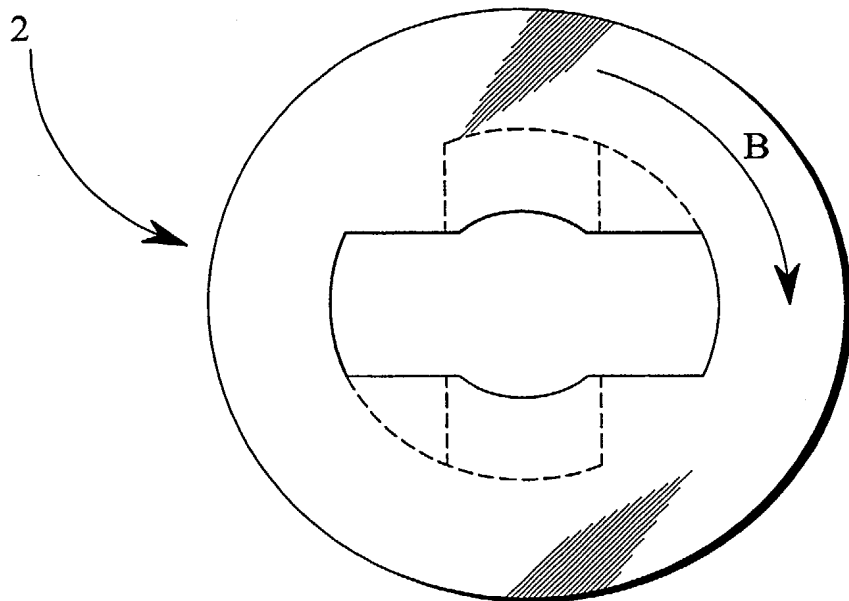


FIG 13

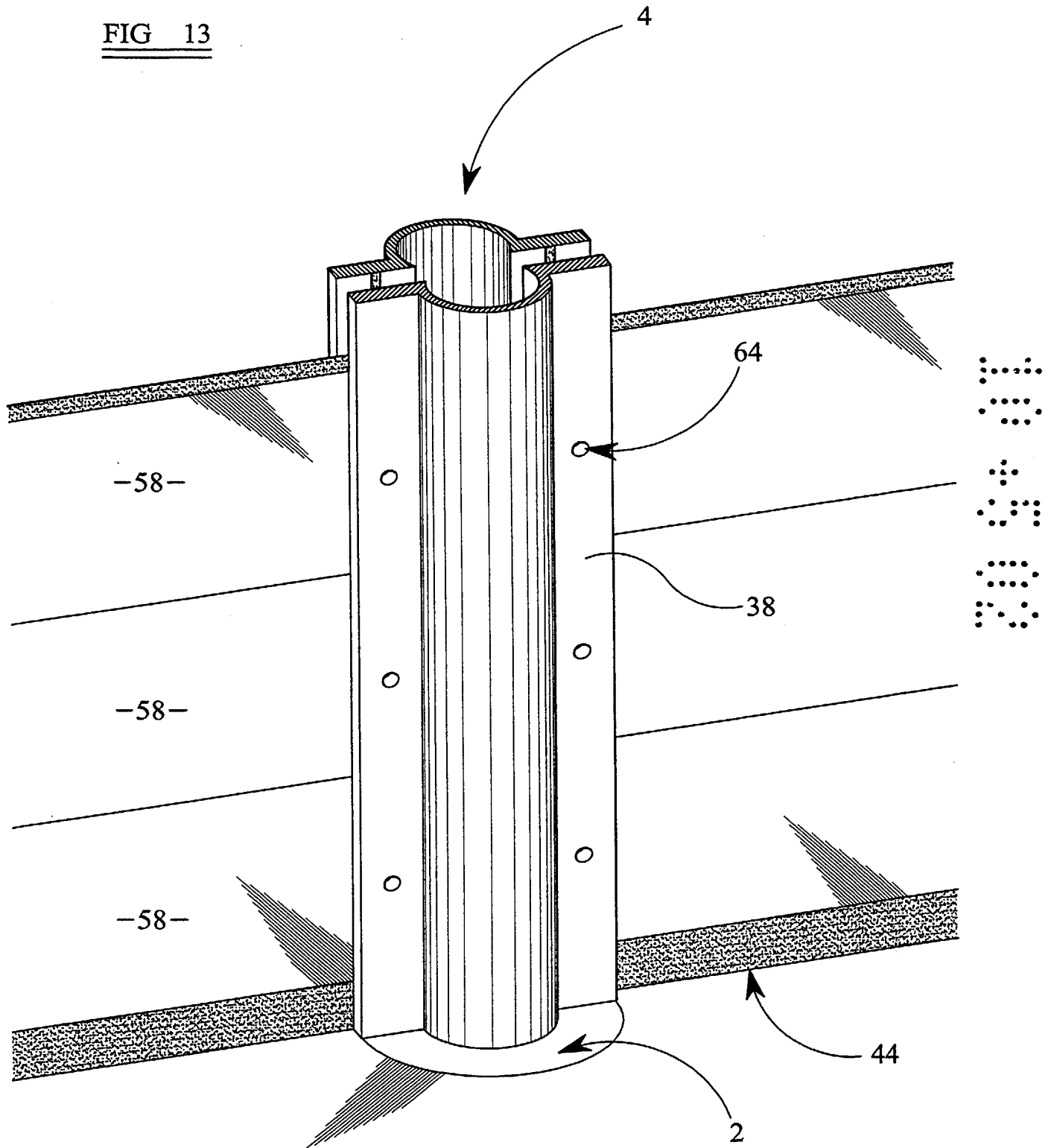


FIG 14

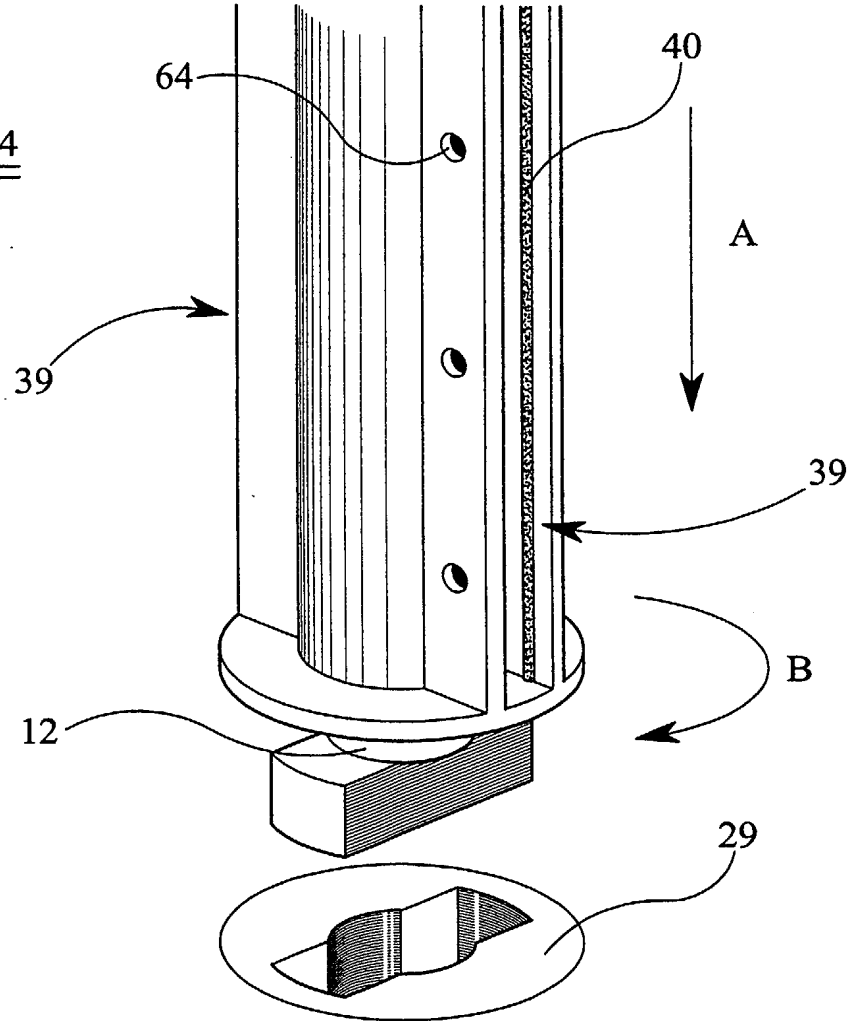


FIG 15

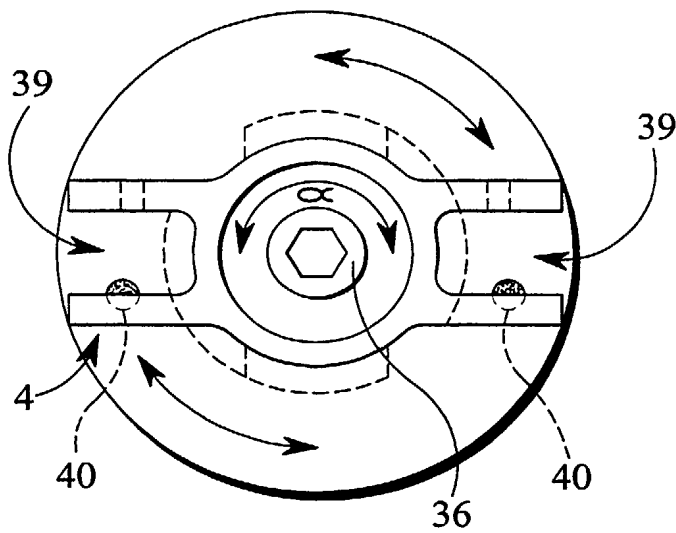
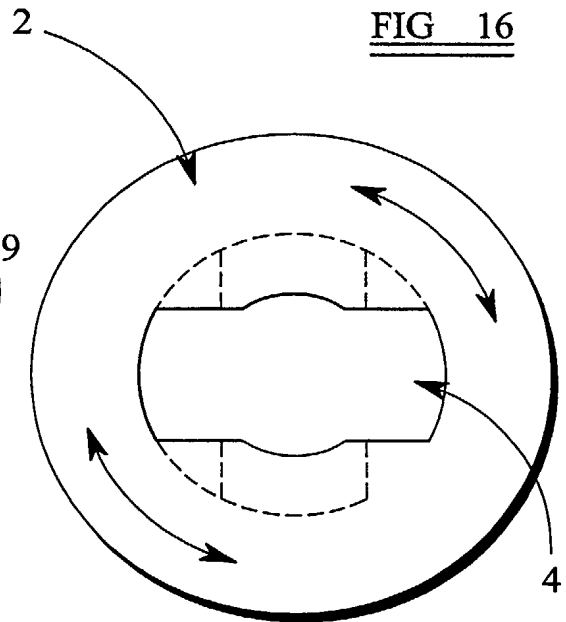


FIG 16





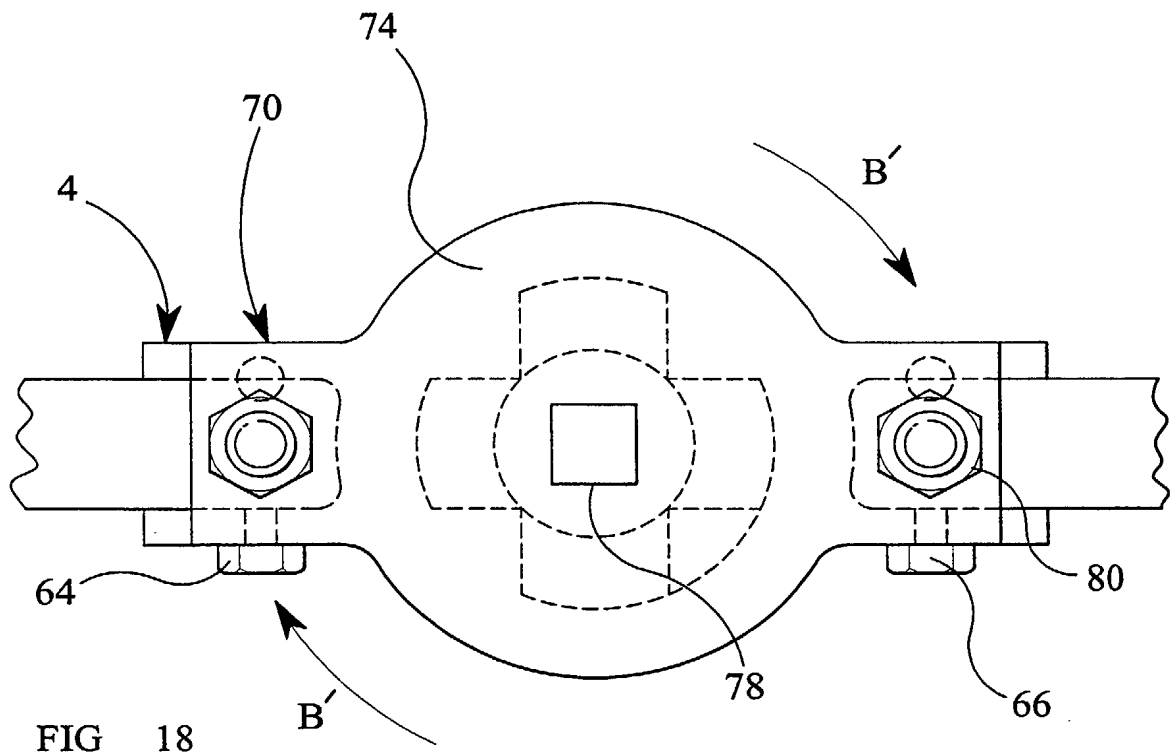
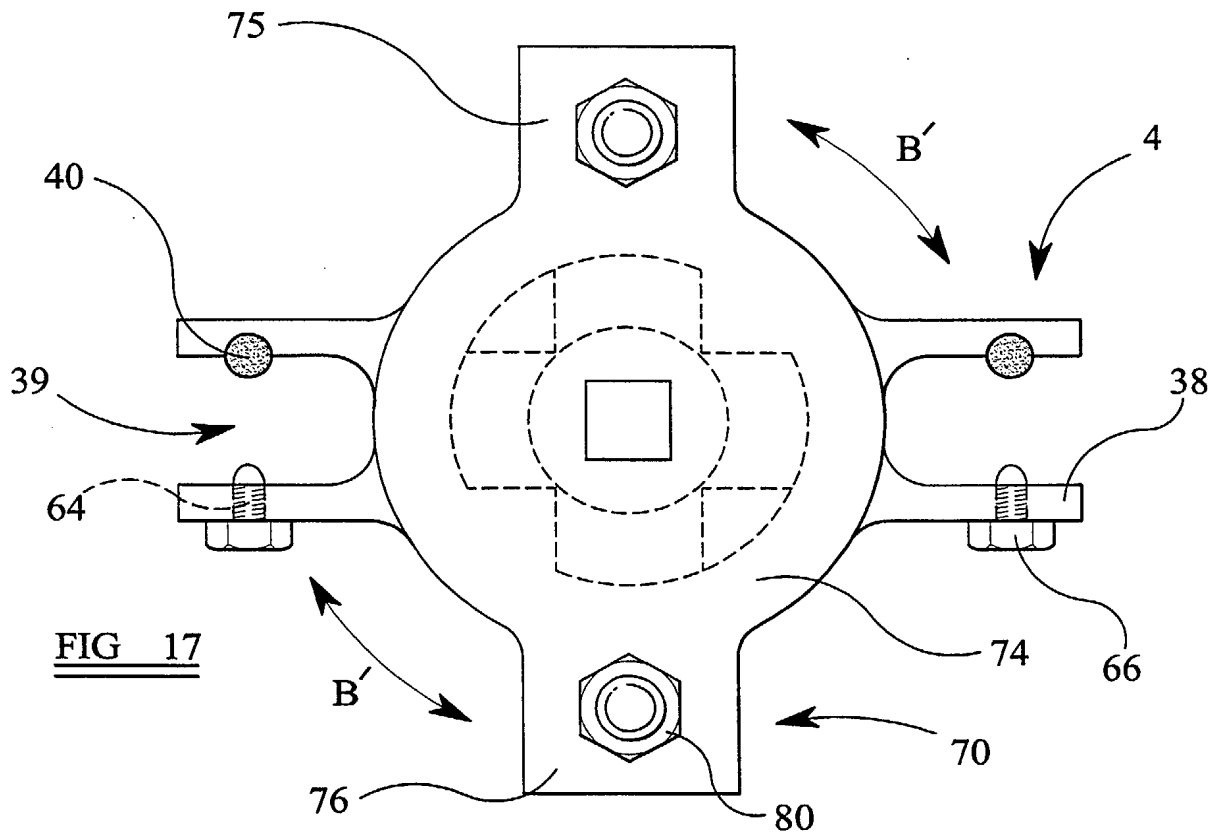


FIG 19

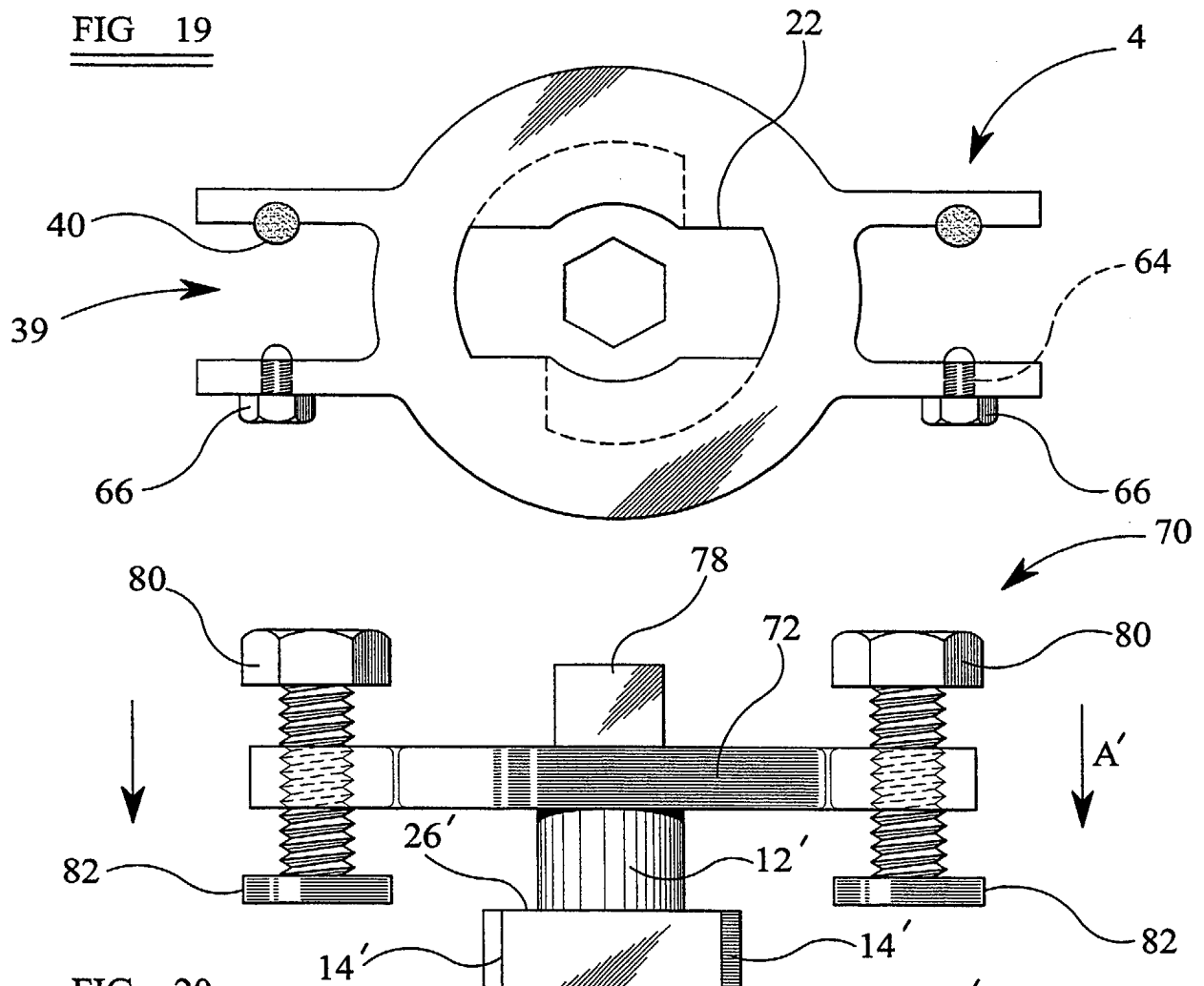
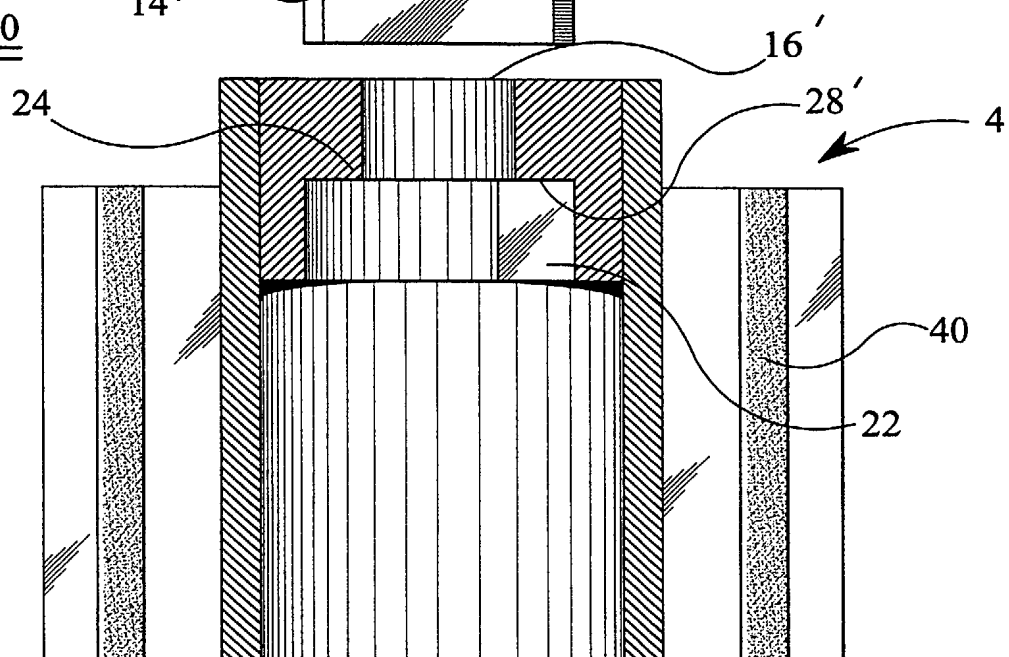
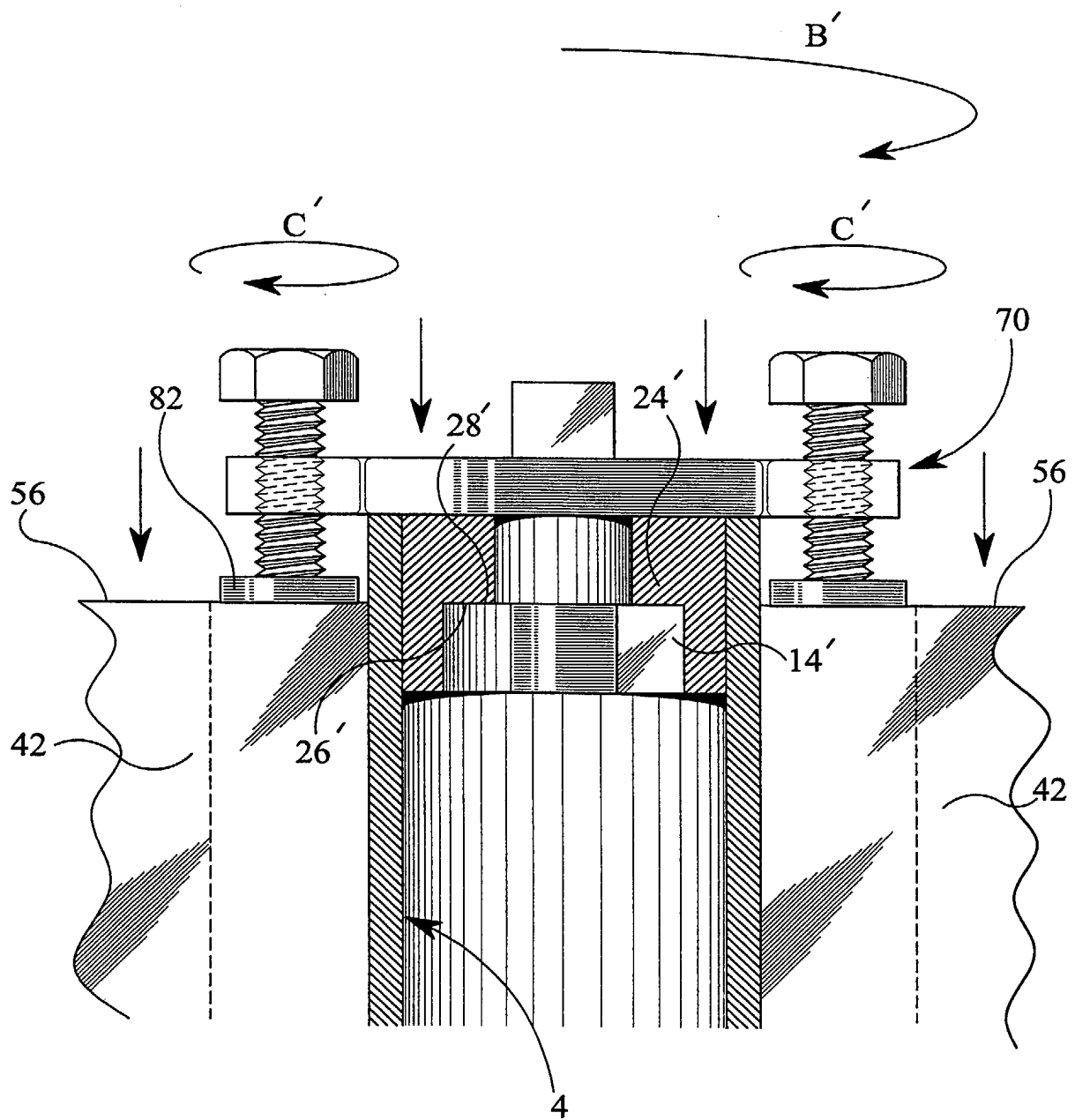


FIG 20





## Improved Flood Defence System

The present invention relates to an improved flood defence system.

5 Flood defence systems are known which comprise a plurality of base elements located at spaced intervals along a bank of a river or similar waterway, the base elements being embedded in concrete or similar, a plurality of support elements mounted to the base elements and one or more barrier elements secured to and supported from the support elements.

10 Over recent years it has become more common for rivers to flood. When a river breaks its banks much damage is caused to the buildings in the flood plane. This damage may be limited to water damage, but often also includes problems associated with an accumulation of silt and sewage deposited by the retreating flood waters.

It makes sense therefore to seek to prevent or at least limit the extent of flooding that may occur. For this reason flood defences of the kind set forth above are often used.

15 However, when not flooding, many people, whether local residents or tourists, will view a river or similar waterway as a natural resource or a feature of interest if not beauty. This appeal is somewhat diminished by a row of base elements of known flood systems spaced along a river bank. Known base elements are somewhat functional in appearance and do detract from an otherwise picturesque appearance of a bank of a waterway.

20 In addition the securing together of known flood defence systems is a time consuming exercise. This may lead to unfortunate results in the case of rapidly rising flood waters.

It is an advantage of the present invention that it seeks to deal with these problems.

According to a first aspect of the present invention a flood defence system is provided

comprising a plurality of base elements, a plurality of support elements for mounting to the base elements and one or more barrier elements for securing to the support elements in which in use the base elements are located below or beneath ground level.

5 This has the advantage that when the support elements and the barrier element(s) are removed the flood defence system provides a minimum detraction from the visual appearance of a bank of a waterway into which the base elements are set.

According to a second aspect of the present invention a flood defence system is provided comprising a plurality of base elements, a plurality of support elements for mounting to the base elements and one or more barrier elements for securing to the support elements in which  
10 the support elements are secured to the base elements by a quick release system.

Preferably the quick release system is a mechanical system such as an interlock or bayonet system.

Preferably, the flood defence system of the present invention is provided with a capping element for securing the one or more barrier elements between respective support elements.

15 According to a third aspect of the present invention an interlock system comprises a female member and a male member, the female member being configured only to receive the male member when the male member is in a preferred orientation to the female member, the male member having been received by the female member, the male member being rotated to locate the male member within the female member, in which one of the members is further  
20 provided with means to draw the male and female member together.

Preferably, the base elements and support elements of the first and second aspects of the invention are mounted to one another using an interlock system according to the third aspect of the invention.

Preferably, the capping elements, at least one barrier element and the support elements of the

first and second aspects of the invention are mounted to one another using an interlock system according to the third aspect of the invention.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

- 5     Figure 1 shows a first side view of a portion of a support element for use in a flood defence system according to the present invention;

Figure 2 shows a side view the support element of Figure 1 turned through 90 degrees;

Figure 3 shows a plan view of the support element on the orientation of Figure 1 and a base element;

- 10    Figure 4 shows a section along line A-A of Figure 3;

Figure 5 shows a plan view of the support element in the orientation of Figure 2 and a base element;

Figure 6 shows a section along line AA-AA of Figure 5;

- 15    Figure 7 shows a perspective view of a portion of a support element for use in a flood defence system according to the present invention;

Figure 8 shows a perspective view, with hidden lines shown in ghost, of a base element for use in a flood defence system according to the present invention;

Figure 9 shows a perspective view of a pair of corresponding support elements and base element;

- 20    Figure 10 shows a perspective view of an assembled flood defence system in accordance with

the present invention;

Figure 11 shows a view similar to that of Figures 3 and 5;

Figure 12 shows a side section of a base element and a support element mounted together;

Figure 13 shows a detail of the flood defence system shown in Figure 10;

5 Figure 14 shows a further support element for use in the present invention;

Figures 15 and 16 show similar views to Figures 3 and 5;

Figure 17 shows a plan view of a capping element and a support element for use in the present invention with the capping element in a first position;

10 Figure 18 shows a plan view of the capping element and the support element of Figure 17 with the capping element in a second position;

Figure 19 shows a section through the capping element and the support element shown in Figure 17;

Figure 20 shows in partial side section the capping element and the support element of Figure 17; and

15 Figure 21 shows in partial side section the capping element and the support element of Figure 17 with a pair of barrier elements.

Where appropriate like reference numerals are used to refer to like parts.

Referring first to Figures 1 to 7, there can be seen corresponding base elements 2 and support elements 4 for use in the present invention.

The support element 4 comprises a pillar 6 having a male member 8 at one end thereof. The base element 2 comprises a stable mass having defined therein a female member 10.

The male member 8 illustrated in Figures 1 and 2 comprises a central shaft 12 connected at a first end to the pillar 6 and having first and second radially extending lobes, fingers or projections 14. The shaft 12 is of length D the significance of which will be explained later. A resilient washer is preferably provided about the shaft against the first end of the pillar.

The female member comprises a shaped recess as shown in Figures 3 to 7. An upper opening of the recess is shaped to receive the shaft and projections of the male member 8 only when the male member has a particular orientation relative to the female member 10.

The recess of the female member 10 has an abutment surface 18 against which a base 20 of the male member 8 may rest upon insertion (arrow A). The male member 8 is then rotated (arrow B), for example by  $90^\circ$ , until it encounters an end wall 22 within the recess. In this way the projections 14 of the male member 8 are each moved beneath an overhanging lip 24 formed by the recess of the female member 10. It is then impossible to withdraw the male member 8 without first counter-rotating it, since upper surfaces 26 of the projections 14 will encounter lower surfaces 28 of the overhanging lips 24.

It can be seen that there should be a close correspondence between the length D of the shaft 12 and the thickness D' of the lip 24. The shaft 12 should be long enough to allow the projections 14 to rotate beneath the overhanging lips 24, but not so long that the pillar 6 of the support element 4 should be able to wobble.

In use, an upper surface 29 of the base element 2 should be set flush with a surface 30 of the ground in which it is embedded (Figure 9). It can then be seen that in the absence of a support element 4, the base element 2 detracts only minimally, if at all, from the visual appearance of the area in which it is set. The base element may optionally be provided with a cover (not shown) both to disguise its function and to prevent the ingress of dirt, refuse or the like which may block the recess when the male member is not present. In such a case,



the cover should be flush with the surrounding ground level.

Clamping means 32 may also be provided within the support element 4 to enable the male member 8 to be clamped or otherwise more firmly secured to the female member 10 of the base element 2. For example the length D of the shaft may be adjustable from within the support element 4 to draw up the projections 14 against the lower surfaces 28 of the overhanging lips 24 of the female member 10.

In a preferred embodiment, a screw 34 having a hexagonal recess 36 is provided within the support element 4 for this purpose. An example of such an arrangement may be seen in Figures 11 and 12. In this embodiment the base element 2 is circular in section. This has an advantage that a hole may be provided using a suitable corer to remove a necessary amount of earth, allowing the base element 2 to be swiftly cemented into position. Adjacent sets of base elements 2 and support elements 4 are offset a distance S from one another to allow the location of a suitably sized barrier element 42 therebetween.

As may be most clearly seen from Figures 10, 13, 14, and 15 the support elements 4 are preferably provided with pairs of outwardly extending parallel flanges 38 running from a first lower end of the support element 4 towards a second upper end of the support element 4. The parallel flanges 38 define barrier element recesses 39.

The inner surfaces of the parallel flanges 38 and the outer portion of the support element 4 therebetween are provided with sealing means 40, for example a rubberised surface. Such a surface may be provided by way of rubber rings, O-rings or similar located on the inner surfaces of the parallel flanges 38.

The parallel flanges 38 are preferably disposed about the pillar 6 angularly offset from the projections 14 of the male member 8.

It will be understood that in considering two adjacent support elements 4, when secured to respective base elements 2, the parallel flanges 38 are preferably directed towards one

another to receive a suitably sized barrier element 42, as shown for example in Figure 10. The barrier element 42 is conveniently rectilinear as shown in the Figures.

The barrier element 42 comprises a panel section provided at a lower edge with a flexible skirt 44. The panel section is made of any convenient material having suitable weight, strength and rigidity characteristics. The flexible skirt 44 is adapted to provide a seal between the ground between the secured base and support elements 2,4 and the lower edge of the barrier element 42. The flexible skirt 44 may conveniently comprise a rubber skirt for this purpose.

While it will be understood that the interaction between the vertical edges of the barrier element 42 and the inner sides of the respective flanges 38 will tend to prevent undesired relative movement, additional locking means 46 may also be provided. As seen in Figure 10 the additional locking means 46 may take the form of a clamping member mounted to an upper end of the pillar 6. In the illustrated embodiment first and second ends 50,52 of a bracket member 48 abut upper edges 56 of adjacent barrier elements 42. The bracket member 48 further includes a tightening mechanism 54, such as a screw threaded member, which in use adjusts the force exerted on upper edges of the barrier elements 42 by the bracket member 48.

In a preferred embodiment, the additional locking means 46 at the top of the pillar 6 and the clamping means 32 toward the lower end of the pillar 6 are connected such that the clamping and locking actions are performed concurrently.

It will be understood that the two sets of parallel flanges 38 extending from the pillar 6 need not be disposed on diametrically opposing sides of the pillar 6. In a preferred embodiment, one or more of the support elements may have the parallel flanges set at other orientations - that is the angle  $\alpha$  (Figure 5) between the sets of parallel flanges need not always equal  $180^\circ$ . In this way the flood defence system of the present invention may be set up to follow the curve of a waterway.

In an alternative embodiment (not shown) more than two sets of parallel flanges 38 may be provided. The sets of parallel flanges 38 may or may not be disposed evenly about the support element 4 as required.

5 A further embodiment of the invention is shown in Figures 13 and 14. As in previous embodiments a support element 4 is secured to a base element 2, with barrier elements 42, extending to each side. Each barrier element 42 comprises a plurality of smaller barrier elements 58. The lowermost smaller barrier element 58 is provided with a flexible skirt 44 at a lower edge. A protrusion is provided extending along an upper edge 60 of the lower most smaller barrier element 58. The lower edge 62 of an adjacent smaller barrier element  
10 is provided with a receiving recess at and a protrusion is provided along the upper edge 60. The protrusion and the receiving recess are shaped so that the protrusion fits snugly in the recess. In this way when the clamping force is directed downwards a watertight seal is formed between each of the smaller barrier elements 58. The downward clamping force may be provided with clamping means as in previous embodiments or by the use of locating  
15 fasteners extending through suitable openings 64 in the parallel flanges 38.

If the smaller barrier elements 58 are manufactured from a suitably resilient material the protrusion and recess may be so designed to be snap fit together, thereby to form a waterproof seal.

In addition to leaving little visible sign when not erected, the modular construction of the  
20 flood defence system disclosed herein provides for further advantages. The components are lightweight and easy to assemble, thereby allowing rapid assembly when required. Since the elements are modular they may easily be stored. In the case of the embodiment of Figures 13 and 14, only a flood barrier of suitable size to the nature of the flooding to be expected need be assembled.

25 Referring now to Figures 17 to 21, there may be seen a capping element 70 for use with the present invention. A support element 4 can be seen provided with a pair of parallel flanges 38. Sealing means 40 are provided in the barrier receiving recesses 39 defined

between the parallel flanges 38. As may be seen in particular from Figure 19, the support element 4 is provided at an upper end with a shaped recess. A capping element 70 is also shown.

5 The capping element 70 comprises a central flange 72 having a central region 74 of generally similar cross-sectional shape to that of the support element 4. First and second lugs 75,76 extend radially from the central region 74. The lugs 75,76 are so sized and shaped that when in the position shown in Figure 18, the lugs 75,76 cover at least a major part of the barrier receiving recesses 39 and associated parallel flanges 38. A central shaft 12' depends from the central region 74 of the capping element 70. The central region 74 of the capping  
10 element 70 is also provided with a raised projection 78.

Each of the first and second lugs 75,76 is provided with a threaded bore through which extends a threaded member 80. Typically, the threaded member 80 takes the form of a headed bolt. Each threaded member 80 is provided at a lower end with an abutment surface 82. Preferably, the abutment surface is in the form of a flange.

15 The central shaft 12' is provided with first and second radially extending lobes, fingers or projections 14'.

An upper opening 16' of the recess in the support member 4 is shaped to receive the central shaft 12' and the projections 14' only when the central shaft and the projections are in a particular orientation relative to the upper opening 16' of the recess.

20 The central shaft 12' of the capping element 70 is inserted into the recess in the support element 4 (arrow A'). The capping element 70 is then rotated (arrow B'), for example by 90°, until the projections 14' of the central shaft 12' encounter an end wall 22' within the recess (Figure 18). In this way the projections 14' of the central shaft 12' are each moved beneath an overhanging lip 24' formed by the recess in the support element 4. It is then  
25 impossible to withdraw the capping element 70 without first counter-rotating it, since upper surfaces 26' of the projections of the central shaft 12' will encounter lower surfaces 28' of the

overhanging lips 24'.

Rotation of the capping element 70 may conveniently be achieved by engagement of a suitable tool with the raised projection 78 of the capping element 70.

5 The rotation of the capping element 70 brings at least one of the threaded members 80 into a position in which the at least one threaded member 80 is located above a barrier element 42 disposed within a corresponding barrier element recess 39. Rotation of the at least one threaded member 80 in a suitable direction (arrow C') causes the threaded member 80 to pass downwards through the lug 75,76 in which the threaded member 80 is located until the abutment surface 82 at the end of the threaded member 80 comes into contact with an upper  
10 surface or edge 56 of the barrier element 42. It will be understood that the abutment surface 82 may conveniently be shaped to receive or otherwise engage with the upper edge 56 of the barrier member 42.

Further movement of the threaded member 80 in this direction will tend to push the capping element 70 from the support element 4. This will happen until the upper surfaces 26' of the  
15 central shaft projections 14' come into contact with the lower surfaces 28' of the overhanging lips 24'. Then further movement of the threaded members 80 is converted into a downward force exerted upon the upper edge 56 of the barrier element 42 forcing the barrier element 42 downward towards the ground.

The barrier element 42 may then be further secured in position by the use of locating  
20 fasteners 66 extending through suitable openings 64 in the parallel flanges 38 (Figure 18).

Removal of the capping element 70 is obtained by moving the threaded members 80 in a reverse direction until the abutment surfaces 82 become disengaged from the upper edges 56 of the barrier element 42 and then turning the capping element 70 to remove the capping element 70 from the support element 4.

25 Due to its construction the flood defence system described herein may also be used to erect

temporary flood barriers about commercial or domestic premises. The system may also be erected along the sides of a road, where for example there may be a risk of flooding due to overflowing drainage ditches and the like.

## CLAIMS

- 1        A flood defence system comprising a plurality of base elements, a plurality of support  
elements for mounting to the base elements and one or more barrier elements for securing  
to the support elements in which in use the base elements are located below or beneath  
5        ground level.
- 2        A flood defence system comprising a plurality of base elements, a plurality of support  
elements for mounting to the base elements and one or more barrier elements for securing  
to the support elements in which the support elements are secured to the base elements by  
a quick release system.
- 10      3        A flood defence system according to claim 2, in which the quick release system is a  
mechanical system such as an interlock or bayonet system.
- 4        A flood defence system according to any previous claim, in which the flood defence  
system is provided with a capping element for securing the one or more barrier elements  
between respective support elements.
- 15      5        A flood defence system according to any previous claim, in which the base elements  
and support elements are mounted to one another using an interlock system comprising a  
female member and a male member, the female member being configured only to receive the  
male member when the male member is in a preferred orientation to the female member , the  
male member having been received by the female member, the male member being rotated  
20      to locate the male member within the female member, in which one of the members is further  
provided with means to draw the male and female member together.
- 6        A flood defence system according to claim 4, in which the capping element, at least  
one barrier element and the support elements are mounted to one another using an interlock  
system comprising a female member and a male member, the female member being  
25      configured only to receive the male member when the male member is in a preferred

orientation to the female member, the male member having been received by the female member, the male member being rotated to locate the male member within the female member, in which one of the members is further provided with means to draw the male and female member together.

- 5    7        A flood defence system substantially as described herein with reference to and as illustrated in the accompanying drawings.





INVESTOR IN PEOPLE

**Application No:** GB 0100814.3 <sup>14</sup>  
**Claims searched:** 1 and any claims made  
appendant thereto.

**Examiner:** Richard Collins  
**Date of search:** 5 April 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): E1H HCB.

Int Cl (Ed.7): E02B 3/10, 7/00, 7/20.

Other: Online EPODOC, JAPIO, WPI.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	DE 19807141 A1 (TSCHALL) see base elements 3 below ground level in figures 2 and 7 especially.	1
X	DE 19512544 C1 (TRAUELSEN) see figures and abstract.	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.